Groundwater availability in the Williston and Powder River basins, North and South Dakota, Montana, Wyoming, Saskatchewan, and Manitoba

Joanna N. Thamke[1], Andrew J. Long[2], Larry D. Putnam[2], Gary D. LeCain[3], Derek W. Ryter[4], Timothy T. Bartos[5], Roy Sando[1], Kyle W. Davis[2], Adel E. Haj[2], Katherine R. Aurand[2], Jonathan D.R.G. Mckaskey[2], Jennifer M. Bednar[2], Diane K. Rauch[1], and Jeremy M. Vinton[6]

[1]Montana Water Science Center, Helena, MT
[2]South Dakota Water Science Center, Rapid City, SD
[3]Office of Groundwater, Denver, CO
[4]Oklahoma Water Science Center, Oklahoma City, OK
[5]Wyoming Water Science Center, Cheyenne, WY
[6]Nebraska Water Science Center, Lincoln, NE

The recent explosion of oil and gas development in the Williston structural basin (containing the Bakken Formation) in the Dakotas, Montana, Saskatchewan, and Manitoba and Powder River structural basin in Montana and Wyoming provides a critical opportunity to study the water-energy nexus within a groundwater context. Large amounts of water for energy development in these basins are withdrawn from the hydraulically-connected bedrock aquifers in the regional lower Tertiary and Upper Cretaceous aquifer system. In some parts of the Powder River structural basin, these aquifers are removed (or stripped) to mine coal for use in the U.S. and Far East. These aquifers are often the shallowest, most accessible, and in some cases, the only potable aquifers within the northern Great Plains.

In the future, groundwater and energy will continue to be important resources in these structural basins. To effectively develop energy resources it is critical to understand the potable groundwater resources in the bedrock aquifer systems in these basins, evaluate how these resources have changed over time, and provide tools to better understand system response to future anthropogenic demands and environmental stress.

This work is part of the U.S. Geological Survey's Groundwater Resources Program to improve understanding of groundwater availability in major aquifers across the Nation (http://water.usgs.gov/ogw/gwrp/). Additional details about this work are available on the project web page: http://mt.water.usgs.gov/projects/WaPR/